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ELECTRICALLY ACTUATED WHEELED TOY

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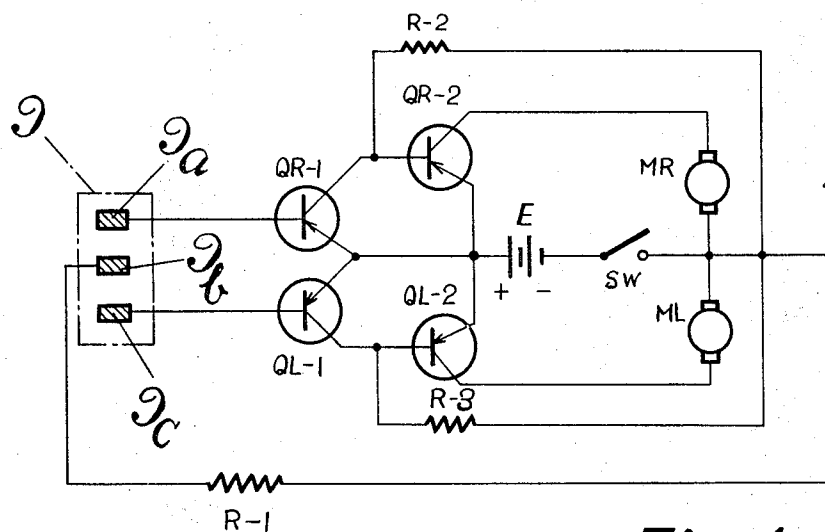


Fig. 2

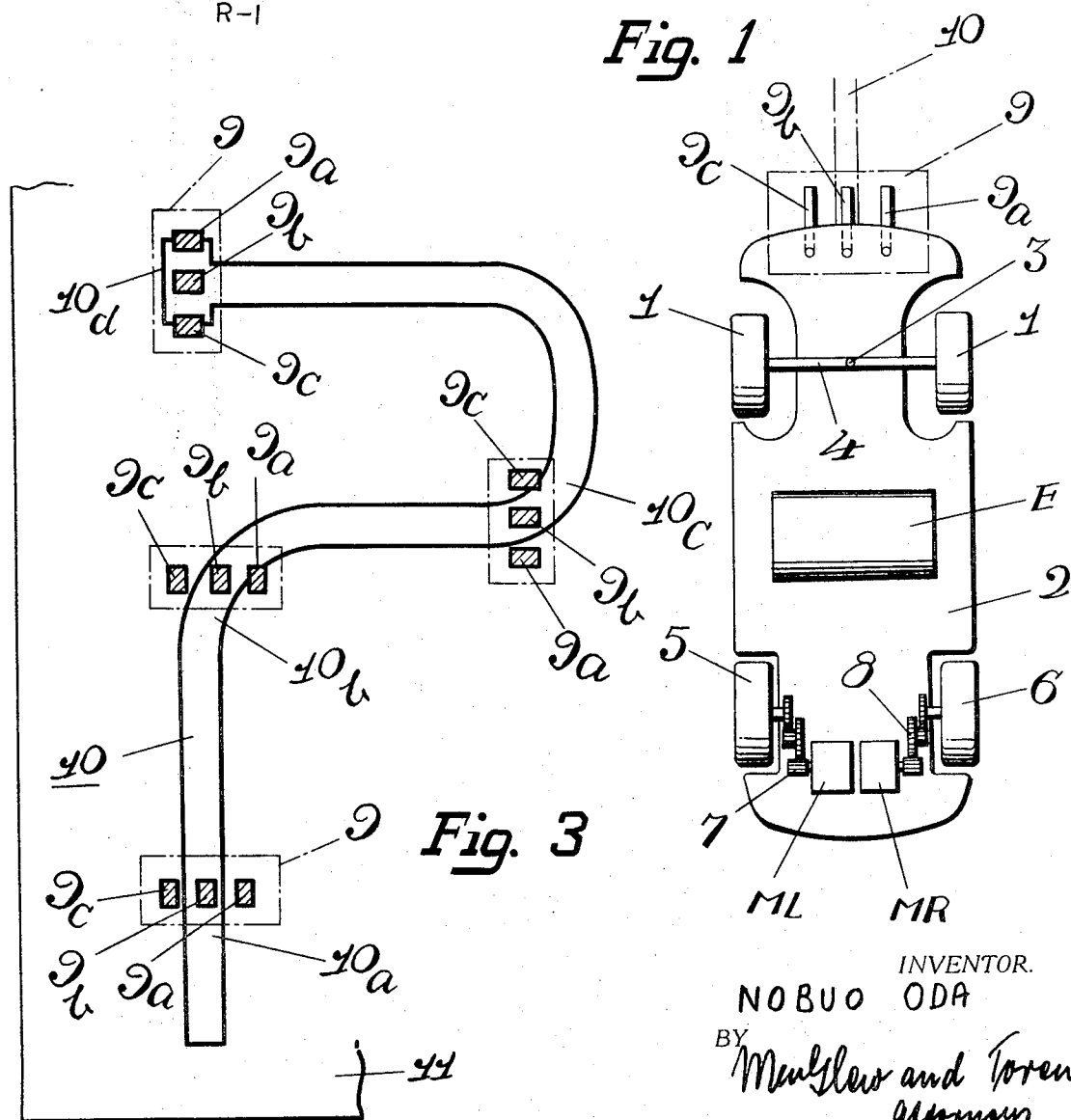


Fig. 1

Fig. 3

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ELECTRICALLY ACTUATED WHEELED TOY
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7 Claims

ABSTRACT OF THE DISCLOSURE

An electrically actuated wheeled toy has a pair of driving wheels independently driven by respective electric motors. Each motor has a respective energizing circuit connected to a source of electric potential on the vehicle. A sensing member at the front of the vehicle carries three contacts for sliding on a surface on which a runway is drawn or imprinted in electrically conductive material. The runway has a width such that normally only the center sliding contact engages the runway but, on a curved portion of the runway, the center contact and one of the two outer contacts are electrically interconnected. This effects de-energization of one of the motors so that the vehicle automatically turns to follow the curvature of the runway. A terminal portion of the runway is laterally extended so that all three sliding contacts are electrically interconnected, effecting de-energization of both motors.

The present invention relates to an electrically actuated wheeled toy based on a quite novel principle.

An object of the present invention is to provide an electrically actuated wheeled toy of a simple structure so adapted that the toy may be advanced, turned leftwards and rightwards and/or stopped, as one likes, through a desired runway constituted from conductive and insulating materials.

A preferred embodiment of the present invention will be explained with reference to accompanying drawings:

FIG. 1 is a plan view showing dispositions of main elements mounted on a chassis of a desired configuration, for example an automobile, shown with a frame member removed therefrom;

FIG. 2 is electric circuits of the above embodiment; and

FIG. 3 is an explanatory view showing an actuating principle of a toy according to the present invention.

Numerals 1, 1 are front driving wheels, which are rotatably mounted on opposite ends of a rod or axle 4 pivoted at 3 on the upper surface of a chassis 2 of insulating material, such as a plastic composition material. Rear driving wheels 5 and 6 are independently driven by respective motors ML and MR, through the medium of respective reduction gears 7 and 8. E is an electric source mounted on the central part of the chassis 2. A sensing member 9, having conductive sliding contacts 9a, 9b, 9c, is secured onto the front part of the chassis 2 in a manner such that the sliding contacts are disposed at equal distances from each other with inclined top ends thereof extending downwardly, so that they may slide on the driving surface when the chassis 2 is actuated.

In FIG. 3, 10 is a runway which is drawn in an appropriate configuration with a conductive material, such as a lead pencil on an insulator 11 constituted from papers or boards. Runway 10 has preferably a width at least similar to or slightly larger than those of said sliding contacts. Runway 10 together with insulator 11 forms a support surface for the toy vehicle, with runway 10 constituting the first part of the support surface and that

part of insulator 11 outside of but contiguous with runway 10 constituting a second part of the support surface.

Runway 10 is constituted from a rectilinear part 10a, a right curved part 10b, a left curved part 10c and a terminal part 10d, which are so designated for explanation.

In the rectilinear part 10a of runway 10, the sliding contact 9b of sensing member 9 slides on the conductive runway 10 and the right and left hand sliding contacts 9a and 9c slide on the insulator 11.

In the right curved part 10b, the centrally positioned sliding contact 9b and the right-hand sliding contact 9a are positioned on the runway 10 and, in turn, in the left curved part 10c, the sliding contact 9b and the left-hand sliding contact 9c are positioned thereon. In the terminal part 10d all three sliding contacts 9a, 9b, 9c are positioned entirely on the runway 10.

Connections of respective sliding contacts 9a, 9b and 9c are shown in FIG. 2, in which QR-1 and QR-2 are transistors for controlling a right-hand driving motor MR, KL-1 and QL-2 are transistors for controlling a left-hand driving motor ML, and R-1, R-2 and R-3 are bias resistors.

SW is a manually operable switch. When switch SW is closed, electric current flows in the collector emitter circuit of the transistor QR-2, which is biased to the conductive state by the resistor R-2, and then flows through the motor MR to complete a circuit to a cathode or a terminal (—) of the electric source. Thus, the right-hand driving motor MR is energized.

On the side of the left-hand driving motor ML electric current flows through the transistor QL-2 and the motor ML to complete a circuit in the same manner, and consequently the left-hand driving motor ML is energized.

Now, when sliding contacts 9a and 9b are interconnected (in practice they are connected through the right curved part 10b of the conductive runway 10), the base of the transistor QR-1 is biased since the resistor R-1 is connected with the cathodic circuit of the electric source E.

Consequently the emitter-collector circuit of the transistor QR-1 is in a conductive state, and the base of the transistor QR-2 is biased to the non-conductive state, blocking conduction of this transistor. Thus, rotation of the right-hand driving wheel MR is stopped. Meanwhile, the circuit of the left-hand driving motor ML, through the transistor QL-1 and QL-2, is left unaffected, since sliding contacts 9b and 9c of the sensing member 9 are not interconnected and therefore the motor ML is maintained energized. Consequently the chassis 2 is steered to the right direction.

Further, when sliding contacts 9b and 9c of the sensing member 9 are interconnected (actually connected through the left curved part 10c of the runway 10), energization of the left-hand driving motor ML is interrupted, while the right-hand driving motor MR is maintained energized. Thus, the chassis is steered leftwards.

When all the sliding contacts 9a, 9b and 9c of the sensing member 9 become interconnected (practically in the terminal part 10d of the runway 10), energization of both the left and right hand driving motors ML and MR is interrupted.

In the structure as described hereinabove, and if the conductive runway 10, constituting a rectilinear part and left and right curved parts, is drawn with a desired conductive material such as pencils on news-papers used as an insulator 11, a car may be actuated along said runway.

In this case, if the runway 10 and the insulator 11 have the same color, it will increase interests of game-players because of difficult discrimination of the outer appearances of the runway 10 and the insulator 11.

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In the present embodiment, the runway is formed in a continuous line with a conductive material, and in another case it may be a dotted-line runway. Further, an insulating runway drawn on a conductive material is applicable with a similar effect.

As described hereinabove, in the present invention motor circuits for rotating right and left hand driving wheels are independently formed, and sliding contacts for opening and closing the motor circuits are slid on a runway formed with conductive and insulating materials, and therefore expected objects can be effectively attained.

What is claimed is:

1. An electrically driven wheeled toy comprising, in combination, a chassis; a pair of driving wheels rotatably mounted on said chassis; a pair of electric motors each driving a respective driving wheel independently of the other driving wheel; a source of electric potential; a pair of energizing circuits each including said source and a respective motor; and a total of three contacts comprising a pair of first contacts and a second contact mounted on said toy for sliding engagement with a support surface including a first part, defining a track having curved sections, and a second part contiguous with the track, one of the parts being formed of insulating material and the other of electrically conductive material; each first contact; each first contact, when engaged with the track, effecting deactivation of its associated energizing circuit, which the other energizing circuit remains activated, to steer the vehicle by differential rotation of said driving wheels.

2. An electrically driven wheeled toy, as claimed in

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claim 1, in which the track is formed of electrically conductive material.

3. An electrically driven wheeled toy, as claimed in claim 1, in which the track is formed of insulating material.

4. An electrically driven wheeled toy, as claimed in claim 1, in which each energizing circuit includes a respective first transistor whose conductivity is controlled by the associated first contact.

5. An electrically driven wheeled toy, as claimed in claim 4, including a pair of second transistors, each controlling the conductivity of a respective first transistor; each first contact controlling the conductivity of a respective second transistor.

6. An electrically driven wheeled toy, as claimed in claim 5, in which each first transistor normally is biased to a conductive state, and each second transistor normally is biased to a non-conductive state; each first contact, when engaged with the track, triggering the associated second transistor conductive, and each second transistor, when triggered conductive, triggering the associated second transistor non-conductive.

7. An electrically driven wheeled toy, as claimed in claim 1, in which said source of electric potential comprises a battery carried by said toy.

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